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Gestational diabetes diagnosed in third trimester of pregnancy: an observation at a Hospital of Women and Children in Vietnam

ABSTRACT

Background. Gestational diabetes mellitus (GDM) remains a significant concern within the medical community due to its high risk, as well as its serious side effects on both the mothers and the fetuses. This study aims to assess the prevalence and the risk factors of gestational diabetes mellitus in pregnant women at Da Nang Hospital for Women and Children.

Methods. A cross-sectional study was conducted on 706 pregnant women at 2428 weeks of gestation at Da Nang hospital to determine the prevalence of gestational diabetes. Multivariate regression analysis was used to clarify the independent risk factors associated with gestational diabetes. All participants were interviewed and-tested for the oral glucose tolerance test (OGTT) to identify the number of gestational diabetes, which was diagnosed according to the American Diabetes Association (ADA) diagnostic criteria in 2014.

Results. Gestational diabetes prevalence was 10.2%; categorized by the number of matched diagnostic criteria: 1 criterion: 7.1%; 2 criteria: 2.1%; 3 criteria: 1.0%. There are four independent risk factors for gestational diabetes determined through multivariate regression analysis: maternal age > 30 years (OR = 2.376), a history of gestational diabetes (OR = 12.211), pre-pregnancy BMI ≥ 23 kg/m^2 (OR = 10.775), a history of fetal macrosomia > 3800 g (OR = 4.655). The risk of gestational diabetes in the group with risk factors was 6.21 times higher than that in the group with no risk factors.

Conclusion. More attention should be paid to the risk factors for gestational diabetes, such as maternal age > 30 years, a history of gestational diabetes, pre-pregnancy BMI ≥ 23 kg/m^2, a history of fetal macrosomia > 3800 g in all pregnant women. (Clin Diabetol 2020; 9; 6: 411–415)

Key words: gestational diabetes mellitus, risk factors, prevalence

Introduction

Gestational diabetes or gestational diabetes mellitus (GDM) is a condition in which diabetes is diagnosed during pregnancy that is not clearly overt diabetes. Gestational diabetes mainly occurs during the 24th–28th week of pregnancy, when a fetus produces a great number of hormones that prevent insulin receptors from functioning properly and disturbs the blood sugar levels.

Generally, gestational diabetes manifests few symptoms, and it is most commonly diagnosed by screening during pregnancy. Diagnostic tests detect inappropriately high levels of glucose in blood samples. Gestational diabetes accounts for 9.6 to 13 percent of all pregnancies [1].

The risk of perinatal mortality does not increase while the risk of fetal macrosomia does. Other perinatal risks include shoulder dystocia, birth injuries such as

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bone fractures and nerve palsies, and hypoglycemia. Long-term adverse health outcomes which are reported among infants born by mothers with gestational diabetes include sustained impairment of glucose tolerance, subsequent obesity (although not when adjusted for size), and impaired intellectual achievement. For women, gestational diabetes is a strong risk factor for diabetes. GDM carries risks for both the mother and her neonates. The risks associated with gestational diabetes are well recognized, and there is a certain treatment to lower maternal glucose levels in order to reduce these risks [2].

Along with the growth of diabetes, comes the continuing spread rate of gestational diabetes mellitus (GDM). At the moment, GDM remains a significant concern within the medical community due to its high risk, as well as its side effects on both the mothers and the fetuses. It is also the reason why the American Diabetes Association (ADA) in 2014 has issued the diagnostic criteria to manage and prevent GDM's complications [3]. We designed this study to assess the prevalence and risk factors of gestational diabetes mellitus in pregnant women at Da Nang Hospital for Women and Children.

Methods

Study population

From January 2018 to March 2019, consecutive women who had either a singleton or twin pregnancy with gestation between 24 and 28 weeks (third trimester) at Da Nang Hospital for Women and Children were enrolled in this study. They visited the Obstetric Department for a regular examination. Women with previously treated gestational diabetes or active chronic systemic disease (except essential hypertension) were excluded.

The present study was approved by the ethics committee of Hue University of Medicine and Pharmacy, Vietnam. All participants were provided written informed consent. Subjects were provided with written information about the study and were briefed orally again before their oral glucose tolerance test. People whose glucose levels exceeded cut-off values for eligibility were diagnosed with gestational diabetes.

Oral glucose tolerance test

A 75-g oral glucose tolerance test (OGTT) was performed in women at 24–28 weeks of gestation who were not previously diagnosed with overt diabetes. Plasma glucose was measured when the patient is fasting and at 1 and 2 hours after the test. The OGTT was performed in the morning after an overnight fast of at least eight hours. The diagnosis of GDM is made when one or more following plasma glucose value are met or exceeded, according ADA 2014 guidelines: 1) Fasting: ≥ 92 mg/dL (5.1 mmol/L); 2) first hour: ≥ 180 mg/dL (10.0 mmol/L); 3) second hour: ≥ 153 mg/dL (8.5 mmol/L) [3].

All participants were advised to follow a 48 hours normal diet before the oral glucose tolerance test and to fast for 8 hours the night before the test. Blood samples were obtained after the overnight fast and one and two hours after the receipt of the 75-g oral glucose load.

Outcome variables

Clinical outcomes among the women included: maternal age, gestational age at birth, birth weight, and body mass index (BMI).

We explored some of the risk factors such as GDM medical history; maternal age; a family medical history of type 1 diabetes; pre-pregnancy BMI; a history of fetal macrosomia and pathological obstetrics (e.g. stillbirth, miscarriage); polycystic ovary syndrome.

Statistical analysis

Statistical analyses were based on the SPSS software, version 16.0. Continuous variables were analyzed by means if they were normally distributed and by medians of nonparametric tests if their distribution was abnormal. A P value of 0.05 was considered to indicate statistical significance.

Results

From January 2018 to March 2019, oral glucose tolerance test (OGTT) was performed in 706 pregnant women at Da Nang Hospital for Children and Women. According to ADA 2014 diagnostic criteria, in this study, GDM accounted for 72 (10.2%). Among pregnancies affected by GDM, according to ADA 2017, the group with ≥ 1 criterion accounted for 7.1% (the highest percentage).

In bivariate analysis, factors correlated with GDM were maternal age ≥ 30 years (OR 1.8, 95%CI 1.1–2.9, P = 0.02); BMI ≥ 23 kg/m^2 (OR 10.8, 95% CI 6.3–18.4, P < 0.001) and a history of fetal macrosomia > 3800 g (OR 5.2, 95% CI 2.7–10.2, P < 0.001) (Table 1). With multivariable regression, there were independent risk factors (IRFs) of GDM indicated in this research, including GDM history, pre-pregnancy BMI ≥ 23 kg/m^2; a history of fetal macrosomia > 3800 g (as shown in Table 2). The percentage of previous birth weight > 3800 g and maternal age > 30 years were highest (37.8% and 37.1%) (Fig. 1). The group with risk factors was more likely to suffer from GDM than the group without those, statistical significance differentiation (14.6 *vs.* 2.7, P < 0.001) (Table 3).

Table 1. Bivariate analysis of the relationship between risk factors and GDM

Variable	Gestational diabetes mellitus n (%)	No gestational diabetes mellitus n (%)	OR (95% CI)	P value
Age ≥ 30 years				
Yes	36 (13.7%)	226 (86.3%)	1.8 (1.1–2.9)	0.02
No	36 (8.1%)	408 (91.9%)		
BMI ≥ 23 kg/m^2				
Yes	47 (33.3%)	94 (66.7%)	10.8 (6.3–18.4)	< 0.001
No	25 (4.4%)	540 (95.6%)		
History of macrosomia > 3800 g				
Yes	35 (18.8%)	151 (81.2%)	5.2 (2.7–10.2)	< 0.001
No	13 (4.2%)	293 (95.8%)		

Table 2. Multivariable regression of risk factors associated with gestational diabetes mellitus

Risk factors	Regression coefficient	P	OR	The interval where OR = 95%
GDM history	2.502	< 0.001	12.211	3.29–45.28
Maternal age > 30	0.865	0.016	2.376	1.17–4.81
Pre-pregnancy BMI ≥ 23 kg/m^2	2.377	< 0.001	10.775	5.27–22.00
History of macrosomia > 3800 g	1.538	< 0.001	4.655	2.24–9.68

*Does not include cases with first-time pregnancies; **does not include cases with twin or more pregnancies

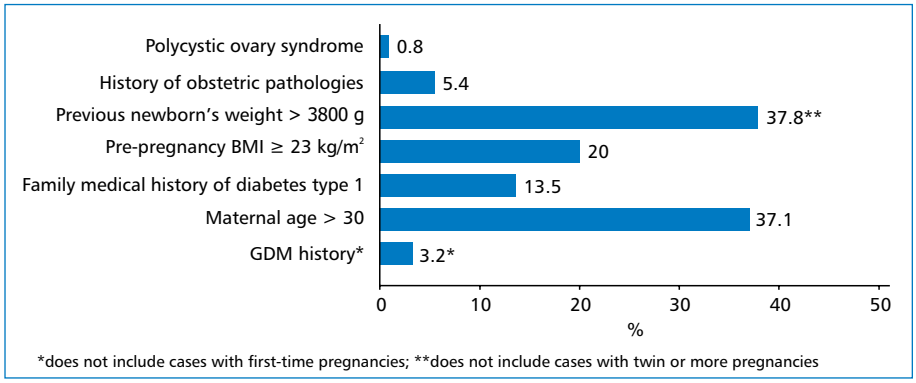

Figure 1. The percentage with respect to independent risk factors

Table 3. The percentage of affected GDM between the group with and without independent risk factors

Risk factors	Number	Gestational diabetes mellitus		No gestational diabetes mellitus	
		n	%	n	%
Yes	445	65	14.6	380	85.4
No	261	7	2.7	254	97.3
P; OR		P < 0.001; OR = 6.21			

Discussion

Prevalence of GDM

In this study, the incidence of GDM was 10.2%, a figure similar to the 10.6% found in the Vietnamese population in Australia [4]. Our findings on prevalence of GDM are fairly similar to a recent study that reported the prevalence of GDM in 8 Eastern and Southeast Asian countries — 10.1% (95% CI 6.5–15.7) [1]. However, the prevalence of GDM in our study was higher than that in

some studies in Vietnam. Thao et al carried out a study in 415 pregnancies (pregnant women) at Bach Mai Hospital showed that the proportion of GDM was 7.9% based on ADA 2003 diagnostic criteria [5]. A research undertaken by Nga in 2009 in 1327 pregnant women at Bach Mai Hospital and Central Maternity Hospital demonstrated the percentage of GDM was 7.8% [6].

The prevalence of GDM in our study was found to be lower when compared with Chinese women who live in China (13.7%) [7] or in Australia (13.9%) [8]. A meta-analysis included 84 studies from 20 Asian countries. They demonstrated the prevalence of GDM was 11.5% (95% CI 10.9–12.1) [9]. We have no clear reason for this difference, but we speculate that it may due to maternal age and BMI disparities, as well as ethnic background [10].

The epidemiological studies aim to determine the prevalence of GDM in a community, which is important to design effective screening strategies, improve the risk factors and manage effectively on pregnant women with hyperglycemia. These benefits reflected the increased use of induction of labor for the mothers and the increased rate of admission to the neonatal nursery for the infants, both of which may be depend on the experience of the physicians. The earlier gestational age at birth, as a result of the induction of labor, may have contributed to the reduction in serious perinatal outcomes. Others have reported an increased rate of cesarean delivery associated with the diagnosis and treatment of gestational diabetes.

Risk factors of GDM

The risk factors of GDM were analyzed in this current review. Multiparity ≥ 2, a previous history of GDM, congenital anomalies, stillbirth, abortion, preterm delivery, macrosomia, having concurrent pregnancy-induced hypertension, polycystic ovary syndrome, age≥25, BMI ≥ 25, and a family history of diabetes are the significant risk factors predictive of GDM in current pregnancy (OR values ranged from 1.90 to 8.42). Most of the guidelines, including those of ADA in 2016, recommend universal screening for GDM in second trimester [11]. According to the American Maternity Association, maternal age ≥ 25 years were considered the average risk factors for GDM. Meanwhile, the Australasian Diabetes in Pregnancy Society (ADIPS) originally recommended that pregnant women aged over 40 years were at high-risk of GDM [12].

Our study showed that those with a history of previous GDM, pre-pregnancy BMI ≥ 23 kg/m^2 and a history of fetal macrosomia > 3800 g are more likely to develop GDM compared those without a history of these conditions, respectively. This finding is consistent with previous studies. Idris et al. conducted the study in 366 Malaysian women showing that the rate of GDM in the age groups < 24, 25–35, ≥ 35 years was: 3%; 14,6%; 38.6% respectively [13]. Studying risk factors in pregnant women in Asia, Wagaarachchi found that the prevalence of GDM among women aged ≥ 35 years was 7.8%, 2.5 times higher than in the age group < 35 years, at 3.1% [2]. According to the study carried out by Rajput in 2011 in 607 pregnant women diagnosed with GDM, the percentage of GDM in patients aged 25 years and older is 3.8 times than that in the group below 25 years old [14]. Yang's research (2009) in 16286 pregnant women has proven the statistically significant difference between the groups of age ≥ 35 and < 35 (OR: 1.97, P < 0.001) [15]. In our research, the percentage of GDM in the group over 30 years old was higher than that in the group 30 and below (13.7% *vs.* 8.1%, P < 0.05). The odds ratio of GDM between the group > 30 years old and group ≤ 30 was 1.8. All the above results come to a general conclusion that the rate of GDM tends to increase with age.

Weight loss at birth was both a consequence of GDM and a risk factor for postpartum pregnancy. Europeans consider a baby with a birth weight ≥ 4000 g to be large for gestational age (LGA); in Vietnam, a baby with a birth weight ≥ 3600 g can be considered to be LGA. Therefore, a history of fetal macrosomia was one of the risk factors for GDM, because increased blood glucose levels go through the placenta causing increased glucose concentration in the fetus and large fetal weight. Insulin had an anabolic effect that stimulates growth either directly or indirectly through growth factors.

All of these warned that the incidence of high-risk pregnancies in the future would increase, and doctors should be aware of the high-risk factors for pregnant women during antenatal care and screening for early detection of GDM.

Conclusion

The prevalence of GDM is rather high (10.2%). The risk factors associated with GDM were identified: maternal age (≥ 30 years) and a history of macrosomia. Overall, the ratio of GDM between groups with and without independent risk factors was 6.21.

Conflict of interest

The authors declare no conflict of interest.

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